

AMENDMENTS TO THE CLAIMS

The claims in this listing will replace all prior versions, and listings, of claims in the application.

1. (Original) An advancing/retracting mechanism of a lens barrel, comprising:
a rotatable ring which is rotatable about a rotational axis extending in a direction of an optical axis, and includes at least one rotation transfer groove located on an inner peripheral surface of said rotatable ring to extend generally parallel to said optical axis;

an advancing/retracting guide ring positioned inside said rotatable ring to be non-rotatable, wherein said advancing/retracting guide ring includes at least one inclined lead slot which penetrates through said advancing/retracting guide ring and which is inclined with respect to both a circumferential direction of said advancing/retracting guide ring and said optical axis direction, and at least one circumferential slot which is communicatively connected with said inclined lead slot and which extends only in said circumferential direction of said advancing/retracting guide ring;

a driven member having at least one follower engaged in said inclined lead slot and said circumferential slot, and further engaged in said rotation transfer groove so as not to move relative to said rotation transfer groove in a rotational direction of said rotatable ring and to be slidably movable in said rotation transfer groove in said optical axis direction;

at least one optical element supported by said driven member; and

a ring spring positioned inside said rotatable ring along an inner peripheral surface thereof and supported by said rotatable ring, said ring spring including at least one follower pressing portion which is engaged in said rotation transfer groove, and is

resiliently deformable in said optical axis direction,

wherein said follower is disengaged from said follower pressing portion of said ring spring, when said driven member and said rotatable ring are positioned relative to each other in said optical axis direction such that said follower is engaged in said inclined lead slot; and

wherein said follower is engaged with said follower pressing portion and resiliently deforms said follower pressing portion by pressing said follower pressing portion against one of two opposed edges of said circumferential slot in said optical axis direction, when said driven member and said rotatable ring are positioned relative to each other in said optical axis direction so that said follower is engaged in said circumferential slot.

2. (Original) The advancing/retracting mechanism according to claim 1, wherein said rotation transfer groove comprises a plurality of rotation transfer grooves located at different circumferential positions,

wherein said follower comprises a plurality of followers provided at different circumferential positions,

wherein said follower pressing portion of said ring spring comprises a plurality of follower pressing portions located at different circumferential positions, and

wherein said ring spring further comprises a plurality of arc portions that project in a direction parallel to said optical axis in an undeformed state, said plurality of follower pressing portions and said plurality of arc portions being alternately arranged.

3. (Original) The advancing/retracting mechanism according to claim 2, wherein said rotatable ring and said advancing/retracting guide ring comprise a coupler that

couples said rotatable ring and said advancing/retracting guide ring such that said rotatable ring and said advancing/retracting guide ring are configured to rotate relative to each other, and

wherein said advancing/retracting guide ring is configured to contact said plurality of arc portions of said ring spring and resiliently deform said plurality of arc portions of said ring spring such that said advancing/retracting guide ring is biased in a direction parallel to said optical axis by a spring force of said ring spring in a state where said rotatable ring and said advancing/retracting guide ring and said are coupled to each other via said coupler.

4. (Original) The advancing/retracting mechanism according to claim 1, wherein said driven member comprises a cam ring having at least one cam groove configured to move said optical element along said optical axis in a predetermined moving path by a rotation of said cam ring.

5. (Original) The advancing/retracting mechanism according to claim 4, wherein said optical element comprises at least two optical elements which move along said optical axis while changing a space therebetween to vary a focal length when said rotatable ring rotates.

6. (Original) The advancing/retracting mechanism according to claim 5, wherein said circumferential slot is elongated in a circumferential direction of said advancing/retracting guide ring and allows said follower to move in said circumferential slot in said circumferential direction of said advancing/retracting guide ring within a predetermined range of movement, and

wherein said two optical elements move along said optical axis while changing a

space therebetween and vary said focal length, when said rotatable ring rotates in a state where said follower is engaged in said circumferential slot.

7. (Original) The advancing/retracting mechanism according to claim 1, wherein said lens barrel is a photographing lens, and

wherein said lens barrel is in a non-photographable state when said follower is engaged in said inclined lead slot, and in a photographable state when said follower is engaged in said circumferential slot.

8. (New) A digital camera having a body and a lens barrel, the lens barrel housed within the body and comprising an advancing/retracting mechanism, the advancing/retracting mechanism comprising:

a rotatable ring which is rotatable about a rotational axis extending in a direction of an optical axis, and includes at least one rotation transfer groove located on an inner peripheral surface of said rotatable ring to extend generally parallel to said optical axis;

an advancing/retracting guide ring positioned inside said rotatable ring, wherein said advancing/retracting guide ring includes at least one inclined lead slot which penetrates through said advancing/retracting guide ring and which is inclined with respect to both a circumferential direction of said advancing/retracting guide ring and said optical axis direction, and at least one circumferential slot which is operatively connected with said inclined lead slot and which extends in said circumferential direction of said advancing/retracting guide ring;

a driven member having at least one follower engaged in said inclined lead slot and said circumferential slot, and further engaged in said rotation transfer groove so as not to move relative to said rotation transfer groove in a rotational direction of said

rotatable ring and to be slidably movable in said rotation transfer groove in said optical axis direction;

at least one optical element supported by said driven member; and

a ring spring positioned inside said rotatable ring along an inner peripheral surface thereof and supported by said rotatable ring, said ring spring including at least one follower pressing portion which is engaged in said rotation transfer groove, and is resiliently deformable in said optical axis direction,

wherein said follower is disengaged from said follower pressing portion of said ring spring, when said driven member and said rotatable ring are positioned relative to each other in said optical axis direction such that said follower is engaged in said inclined lead slot; and

wherein said follower is engaged with said follower pressing portion and resiliently deforms said follower pressing portion by pressing said follower pressing portion against one of two opposed edges of said circumferential slot in said optical axis direction, when said driven member and said rotatable ring are positioned relative to each other in said optical axis direction so that said follower is engaged in said circumferential slot.

9. (New) The camera according to claim 8, wherein said rotation transfer groove comprises a plurality of rotation transfer grooves located at different circumferential positions,

wherein said follower comprises a plurality of followers provided at different circumferential positions,

wherein said follower pressing portion of said ring spring comprises a plurality of

follower pressing portions located at different circumferential positions, and

wherein said ring spring further comprises a plurality of arc portions that project in a direction parallel to said optical axis in an undeformed state, said plurality of follower pressing portions and said plurality of arc portions being alternately arranged.

10. (New) The camera according to claim 9, wherein said rotatable ring and said advancing/retracting guide ring comprise a coupler that couples said rotatable ring and said advancing/retracting guide ring such that said rotatable ring and said advancing/retracting guide ring are configured to rotate relative to each other, and

wherein said advancing/retracting guide ring is configured to contact said plurality of arc portions of said ring spring and resiliently deform said plurality of arc portions of said ring spring such that said advancing/retracting guide ring is biased in a direction parallel to said optical axis by a spring force of said ring spring in a state where said rotatable ring and said advancing/retracting guide ring and said are coupled to each other via said coupler.

11. (New) The camera according to claim 8, wherein said driven member comprises a cam ring having at least one cam groove configured to move said optical element along said optical axis in a predetermined moving path by a rotation of said cam ring.

12. (New) The camera according to claim 11, wherein said optical element comprises at least two optical elements which move along said optical axis while changing a space therebetween to vary a focal length when said rotatable ring rotates.

13. (New) The camera according to claim 12, wherein said circumferential slot is elongated in a circumferential direction of said advancing/retracting guide ring and allows

said follower to move in said circumferential slot in said circumferential direction of said advancing/retracting guide ring within a predetermined range of movement, and

wherein said two optical elements move along said optical axis while changing a space therebetween and vary said focal length, when said rotatable ring rotates in a state where said follower is engaged in said circumferential slot.

14. (New) The camera according to claim 8, wherein said lens barrel is a photographing lens, and

wherein said lens barrel is in a non-photographable state when said follower is engaged in said inclined lead slot, and in a photographable state when said follower is engaged in said circumferential slot.